

What is claimed is:

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1. A method of enhancing a production recipe, comprising:
annotating one or more actions in the production recipe with a desired
intention for the action.
2. The method of claim 1 further comprising annotating the one or more actions
with a desired state for the action.
- 10 3. A computerized method of generating a production recipe, the method
comprising:
receiving knowledge from one or more sources; and
generating through computer automated operations a recipe comprising a set
15 of actions and the purpose of the underlying process.
4. The computerized method of claim 3 further comprising modifying the recipe.
5. The computerized method of claim 3 wherein the knowledge is received from
20 a user.
6. A computerized method for controlling a production process, the method
comprising:
receiving data from multiple knowledge sources;
25 storing the data in a structured knowledge repository; and
modifying a recipe for a batch processing situation using the data stored in the
knowledge repository.
7. The computerized method of claim 6 wherein modifying the recipe further
30 comprises using inputs from a user.

8. The computerized method of claim 6 wherein the recipe contains steps and purposes.

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- 5 9. A computerized system comprising:
- a Knowledge Builder to derive from multiple knowledge sources;
 - a Structured Knowledge Repository to store and organize the knowledge; and
 - a Decision Maker to use the knowledge stored in the structured knowledge repository to identify one or more modifications of recipe steps.
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10. The computerized system of claim 9 wherein the recipe is for a batch process.
11. The computerized system of claim 9 wherein the knowledge builder extracts of knowledge from multiple sources through one or more Machine Learning
- 15 techniques.
12. The computerizes system of claim 11 wherein the different Machine Learning techniques act independently from each other.
- 20 13. The computerized system of claim 12 wherein knowledge builder is scalable by adding additional the Machine Learning techniques.
14. The computerized system of claim 11 wherein the machine learning techniques are selected from the group consisting of: explanation-based learning,
- 25 memory based learning, situation-dependent learning.
15. The computerized system of claim 9 wherein the knowledge building component further receives feedback from a user.

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16. The computerized system of claim 9 wherein the knowledge builder is scalable to incorporate new knowledge.
17. The computerized system of claim 9 wherein the knowledge builder is
5 scalable to incorporate new knowledge extraction techniques.
18. The computerized system of claim 9 wherein the structured knowledge repository uses abstraction-decomposition space (ADS) techniques.
- 10 19. The computerized system of claim 18 wherein the Structured Knowledge Repository organizes knowledge and provides links between specific pieces of information and the functional purposes to which the knowledge can be put.
20. The computerized system of claim 9 wherein the Decision Maker assembles
15 the knowledge into an answer to a query.
21. The computerized system of claim 20 wherein the answer to the query is in the form of a recipe modification that meets desired goals and constraints.
- 20 22. The computerized system of claim 9 wherein the decision maker displays knowledge to a user.
23. A computer-readable medium having computer-executable instructions for a method of managing a production process, the method comprising:
25 receiving one or more desired purposes for the production process;
receiving a recipe; and
generating an advanced recipe comprising a set of actions and the purpose of the underlying process.

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24. The computer readable medium of claim 22, wherein the method further comprises modifying the advanced recipe in response to a user.

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